What is claimed is:

1. An isolated bacterial heme binding protein wherein said protein reversibly binds oxygen with a low affinity and wherein said a heme binding domain of said protein shows at least 20% identity to a myoglobin heme binding domain.

2. The isolated heme-binding protein according to claim 1, wherein the protein comprises a heme binding domain and a signaling domain.

3. The isolated heme-binding protein according to claim 1, wherein the protein is isolated from *Archaea*.

4. The isolated heme-binding protein according to claim 3, wherein the protein is isolated from *Halobacterium salinarum*.

5. The isolated heme-binding protein according to claim 4, wherein the protein's activity is salt tolerant.

6. The isolated heme-binding protein according to claim 1, wherein the protein has an amino acid sequence of SEQ. ID. No. 2.

7. The isolated heme-binding protein according to claim 1, wherein the protein is isolated from *Bacillus subtilis*.

8. The isolated heme-binding protein according to claim 7, wherein the protein has an amino acid sequence of SEQ. ID. No. 4.

R1.126 9. ~~7. A fragment of the isolated heme-binding protein according to claim 1, wherein said fragment comprises a heme-binding domain.~~

R1.126 10. ~~8. The fragment according to claim 4, further comprising a heterologous signal transduction domain.~~

R1.126 11. ~~9.~~ A blood substitute comprising:

a bacterial heme binding protein wherein said protein reversibly binds oxygen with a low affinity.

R1.126 12. ~~10.~~ The blood substitute according to claim 9, wherein the protein comprises a heme binding domain and a signaling domain.

R1.126 13. ~~11.~~ The blood substitute according to claim 10, wherein the protein is isolated from *Archaea*.

R1.126 14. ~~12.~~ The blood substitute according to claim 11, wherein the protein is isolated from *Halobacterium salinarum*.

R1.126 15. ~~13.~~ The blood substitute according to claim 12, wherein the protein's activity is salt tolerant.

R1.126 16. ~~14.~~ The blood substitute according to claim 9, wherein the protein has an amino acid sequence of SEQ. ID. No. 2.

R1.126 17. ~~15.~~ The blood substitute according to claim 9, wherein the protein is isolated from *Bacillus subtilis*.

R1.126 18. ~~16.~~ The blood substitute according to claim 15, wherein the protein has an amino acid sequence of SEQ. ID. No. 4.

R1.126 19. ~~17.~~ The blood substitute according to claim 15, comprising a fragment of the isolated heme-binding protein having a heme-binding domain.

R1.126 20. ~~18.~~ The blood substitute according to claim 17, further comprising a heterologous signal transduction domain.

R1.126 21. ~~19.~~ A method of treating a patient suffering from low blood levels comprising: administering to the patient a blood substitute according to claim 9.

R1.126 22. ~~20.~~ The method according to claim 19, further comprising: regulating the oxygen binding of the heme-binding protein by modifying the signaling domain.

R1.126 23 ~~21.~~ A method for controlled storage of oxygen, comprising: providing a bacterial heme binding protein wherein said protein reversibly binds oxygen with a low affinity; and contacting said protein with oxygen allowing the protein to bind and store oxygen.

R1.126 24 ~~22.~~ The method according to claim 21, further comprising: triggering the release of oxygen from the protein by activating the signaling domain.

R1.126 25 ~~23.~~ The method according to claim 21, wherein the protein comprises a heme binding domain and a signaling domain.

R1.126, 21-25 26. ~~24.~~ The method according to claim 21, wherein the protein is isolated from *Archaea*.

R1.126 27. ~~25.~~ The method according to claim 24, wherein the protein is isolated from *Halobacterium salinarum*.

R1.126 28. ~~26.~~ The method according to claim 25, wherein the protein's activity is salt tolerant.

R1.126 29. ~~27.~~ The method according to claim 26, wherein the protein has an amino acid sequence of SEQ. ID. No. 2.

R1.126 30. ~~28.~~ The method according to claim 21, wherein the protein is isolated from *Bacillus subtilis*.

R1.126 31. ~~29.~~ The method according to claim 28, wherein the protein has an amino acid sequence of SEQ. ID. No. 4.

R1.126 32. ~~30.~~ The method according to claim 21, wherein the protein is a fragment of an isolated bacterial heme binding protein which reversibly binds oxygen with a low affinity, wherein said fragment comprises a heme-binding domain.

R1.126 33. ~~31.~~ The method according to claim 30, wherein the fragment further comprising a heterologous signal transduction domain.

R1.126 34. ~~32.~~ A method of sensing gaseous ligands comprising:

providing a heme binding bacterial protein wherein said protein reversibly binds oxygen with a low affinity;

exposing said protein to a sample to be tested; and

measuring a change in the conformation of the protein.

R1.126 35. ~~33.~~ The method according to claim 32, wherein said measuring is carried out optically.

R1.126 36. ~~34.~~ The method according to claim 32, wherein said measuring is carried out electronically.

R1.126 37. ~~35.~~ The method according to claim 32, wherein the gaseous ligand is selected from the group consisting of O_2, NO, CO, and CN.

R1.126 38 ~~36.~~ The method according to claim 32, wherein the gaseous ligand is O_2.

R1.126 ~~37.~~ The method according to claim 32, wherein the protein comprises a heme binding domain and a signaling domain.

R1.126 40. ~~38.~~ The method according to claim 32, wherein the protein is isolated from *Archaea*.

R1.126 41. ~~39.~~ The method according to claim 38, wherein the protein is isolated from *Halobacterium salinarum*.

R1.126 42. ~~40.~~ The method according to claim 39, wherein the protein's activity is salt tolerant.

R1.126 43. ~~41.~~ The method according to claim 40, wherein the protein has an amino acid sequence of SEQ. ID. No. 2.

R1.126 44. ~~42.~~ The method according to claim 32, wherein the protein is isolated from *Bacillus subtilis*.

R1.126 45. ~~43.~~ The method according to claim 42, wherein the protein has an amino acid sequence of SEQ. ID. No. 4.

R1.126 46. ~~44.~~ The method according to claim 32, wherein the protein is a fragment of an isolated bacterial heme binding protein which reversibly binds oxygen with a low affinity, wherein said fragment comprises a heme-binding domain.

R1.126 47. ~~45.~~ The method according to claim 44, wherein the fragment further comprising a heterologous signal transduction domain.

R1.126 48. ~~46.~~ A chimeric protein comprising:

a heme-binding domain of an isolated heme binding bacterial protein; and

a heterologous signaling domain.

R1.126 49. ~~47.~~ The chimeric protein according to claim 46, wherein the heterologous signaling domain is a mutated signaling domain having altered affinity for its ligand.

R1.126 50. ~~48.~~ The isolated heme-binding protein according to claim 47, wherein the protein comprises a heme binding domain and a signaling domain.

R1.126 51. ~~49.~~ The isolated heme-binding protein according to claim 47, wherein the protein is isolated from *Archaea*.

R1.126 52. ~~50.~~ The isolated heme-binding protein according to claim 49, wherein the protein is isolated from *Halobacterium salinarum*.

R1.126 53. ~~51.~~ The isolated heme-binding protein according to claim 50, wherein the protein's activity is salt tolerant.

R1.126 54. ~~52.~~ The isolated heme-binding protein according to claim 51, wherein the protein has an amino acid sequence of SEQ. ID. No. 2.

R1.126 55. ~~53.~~ The isolated heme-binding protein according to claim 47, wherein the protein is isolated from *Bacillus subtilis*.

R1.126 56. ~~54.~~ The isolated heme-binding protein according to claim 47, wherein the protein has an amino acid sequence of SEQ. ID. No. 4.

R1.126 57. ~~55.~~ An isolated nucleic acid molecule wherein the nucleic acid molecule encodes a heme binding bacterial protein wherein said protein reversibly binds oxygen with a low affinity.

R1.126 58. ~~56.~~ The isolated nucleic acid molecule according to claim 55, wherein the nucleic acid molecule comprises:

a nucleotide sequence as shown in SEQ. ID. No. 1; or

a nucleotide sequence which hybridizes to a nucleic acid molecule having the sequence shown in SEQ. ID. No. 1 under stringent conditions.

R1.126 59. ~~57.~~ A vector comprising the nucleic acid molecule according to claim 55.

R1.126 60. ~~58.~~ A host cell transformed with the vector according to claim 57.

R1.126 61. 59. The isolated nucleic acid molecule according to claim 55, wherein the nucleic acid molecule comprises:

a nucleotide sequence as shown in SEQ. ID. No. 3; or

a nucleotide sequence which hybridizes to a nucleic acid molecule having the sequence shown in SEQ. ID. No. 3 under stringent conditions.

R1.126 62. 60. A vector comprising the nucleic acid molecule according to claim 59.

R1.126 63. 61. A host cell transformed with the vector according to claim 60.